Werner restricted the use of the term by making the hornblende-orthoclase rock of the Planenschen-grund, near Dresden, the type of the class; and now geologists are agreed in retaining the term for rocks with granitic structure but of intermediate composition, containing little or no free quartz, and having orthoclase as their predominant felspar. Rocks of this class do occur at Aswan, as shown by Dr. Ball, but they appear to be in all cases subordinate to the true granites with which they are associated.

The chief rocks quarried at Aswan, both in ancient times and also recently, for the construction of the dam, are these granites, sometimes coarse-grained and porphyritic, at other times fine-grained. Both hornblendic varieties and types of these rocks rich in mica occur, and by the diminution of proportion of the quartz and the increase in abundance of the subordinate plagioclase, the rocks pass locally by insensible gradations into syenites and diorites.

Full descriptions with excellent figures (plates iv. to xi.) are given by Dr. Ball, not only of these plutonic types, but also of the various metamorphic rocks, and of the rocks that form dykes cutting through both metamorphic and plutonic masses. The survey has, of course, given the author abundant opportunities for collecting specimens, of which he has made ample use. Like Prof. Bonney, who examined a series of the Aswan rocks collected by the late Principal Dawson in 1886, Dr. Ball is struck with the general resemblance of the metamorphic and igneous rocks, both of Upper Egypt and the Sinaitic area, to the Archæan rocks of North America, and he suggests that they may not improbably be of the same great antiquity. The crushing and faulting of these rocks with the intrusion of various dykes took place, the author of this memoir argues, at a date long subsequent to their formation, and this action continued quite down to Cretaceous times, when the Nubian sandstone was deposited quite unconformably on their greatly denuded surfaces. Near the cataract of Aswan no remains of the Eocene clays and limestones, found in other parts of Upper Egypt, occur —they have probably been removed by denudation. Subsequently to the Eocene period, there has been elevation and great denudation. At this period of elevation most of the faults which play such an important part, as shown in this memoir, in producing the general features of the cataract area were formed. By the denudation the older metamorphic and igneous rocks were exposed, and the escarpments and outliers of Nubian sandstone formed.

In the concluding pages of this interesting memoir the author adduces evidence to show that the ancient course of the Nile lay in a broad valley east of the present river, and he discusses the problem of the causes which have led to important changes in the course of the river and the effects of these changes on the character of the country. We must wait for the extension of the geological survey of Egypt, to districts which at present remain untouched, for a full solution of these problems. It is interesting to learn that, although the site of the great Nile dam was determined prior to the execution of the geological survey, Dr. Ball is of opinion that the line actually chosen for it was a satisfactory one, and that the results of the survey do not indicate that any better site could have been selected for it; and, further, that the straight form, finally adopted for the dam, has been at least equally successful in avoiding the difficulties presented by crushed and decayed rocks as would the curved form originally suggested.

J. W. J.

THE "HISTOIRE INTIME" OF NITROUS OXIDE.

Das Lachgas: eine chemisch-kultur-historische Studie. By Prof. Ernst Cohen. Pp. iv+99. (Leipzig: W. Engelmann, 1907.) Price 3.60 marks.

HABITUÉS of the Royal Institution, and especially those who have interested themselves in its early history, are aware of the existence of a characteristically coarse caricature of Gillray's entitled "Scientific Researches! New Discoveries in Pneumaticks! Or an Experimental Lecture on the Powers of Air," which first appeared in 1802, and is stated by Wright and Evans, who published in 1851 a descriptive account of Gillray's cartoons, to represent Dr. Garnett, the first professor of chemistry in the Royal Institution, administering, with the aid of his assistant, Humphry Davy, what is presumably laughing-gas to Sir John C. Hippesley, a noted patron of the Institution and prominent as a manager, with results disquieting to his "internal economy," and disastrous to "That garment 'twere rude to do more than allude to," as Thomas Ingoldsby says.

This print is hardly so rare as Prof. Cohen would seem to imply, and it has already done duty in connection with the early history of the Royal Institution. It—or rather what Prof. Cohen styles the *right* half of it—is reproduced in Thorpe's biographical account of Davy, published some years ago by Messrs. Cassell. Prof. Cohen, apparently on the sole authority of Pictet, who visited London in 1801, and contrary to all contemporary evidence and the testimony of the editors of Gillray's works, inclines to the opinion that the person administering the nitrous oxide is Thomas Young, who is styled professor of chemistry in the Royal Institution, a position he never held. Of course, a caricaturist like Gillray, who allowed himself unlimited licence, and was bound by no rules either of decorum or probability, might, in portraying a wholly imaginary incident, commit any anachronism he pleased. But there was no reason at the moment why Gillray should be guilty of the anachronism of putting Young into a position he never occupied, since Garnett was the actual professor of chemistry when Davy was assistant, and the humour of the incident —such as it is—is in no wise dependent upon what lecturer is behind the table. Pictet was certainly present at a symposium on a certain Saturday evening at the Royal Institution in the early summer of 1801, when, to quote from a letter from Davy to his friend King at Bristol, "there was respiration, nitrous oxide, and unbounded applause. To-morrow, a party of philosophers meet at the Institution to inhale the joy-inspiring gas. It has produced a great sensation

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—*Ça ira.*" It was no doubt this " great sensation " that provoked Gillray's cartoon.

But who the lecturer may be would be a matter of small importance except for the circumstance that Prof. Cohen devotes much of his space to a somewhat laboured commentary on the print.

The caricature constitutes, in fact, as he explains in his preface, the *motif* of his little book—a fascimile reproduction of it is given as the frontispiece—and it was the chief inducement which led him to put together at such length the *histoire intime* of laughing-gas.

Such a book is probably not intended to be a serious contribution to historical chemistry. From the fact that it is dated from Zandvoort-Bad in the August of last year—that " summer of drear and dour, implacable rain "—we incline to the opinion that it was a holiday occupation imposed by the tedium of a particularly dolorous time.

With the aid of much " process work " and a wealth of classical allusion, Dr. Cohen has managed to pack within the compass of 100 pages the results of a considerable amount of bibliographical research on matters of no very great importance. Like the famous Cid Hamet, he is the most diligent searcher after the minutest circumstances, " even to the very atoms of his true history," and everything relating to laughing-gas—at least as regards its *histoire intime*—is set down with the most painstaking particularity. The history opens with Mitchill in America and his " oxide of Septon," passes on to Beddoes of Bristol and his Pneumatic Institution; the engagement there of Davy, and his discovery of the physiological effect of the respiration of nitrous oxide, which he prepared by the decomposition of ammonium nitrate in the manner first described by Berthollet and La Place, and, apparently independently, by Deiman and Paets van Troostwijk. There is, of course, no reason why chemistry should not have its Captain Gronow or its Greville memoirs, and, incidentally, Prof. Cohen has much to say of the personal history of certain of those whose names are connected, however slightly, with the *histoire intime* of nitrous oxide. The manner, for example, in which he runs his countryman Adriaan Paets van Troostwijk to earth is characteristic of your born commentator.

Davy's rhapsodical description of his sensations on breathing nitrous oxide is naturally given at length. Next we have a series of portraits, with here and there slight personal touches, of distinguished individuals who have breathed nitrous oxide, or who have seen others breathe it. They range from Southey and Coleridge in England to Fourcroy, Vauquelin, Thénard, Orfila, and Proust in France, and Pfaff and Wurzer in Germany. Indeed, the wealth of pictorial illustration of the *histoire intime* of nitrous oxide which Dr. Cohen's industry and perseverance have enabled him to accumulate is quite remarkable. The only omission we have been able to discover is a representation of a dentist's chair.

Davy's connection with the place, together with Gillray's caricature, is, of course, the main reason why Prof. Cohen devotes so much of his space to the early history of the Royal Institution, which *pace* Gillray and the symposium already referred to had very little to do with laughing-gas. To what extent the gas entered into its history may be seen from Pictet's lively account, published in 1802. Dr. Cohen, as becomes the true commentator, displays much erudition and no small amount of acumen in expounding the true inwardness of Gillray's drawing. The meaning is not very cryptic, after all. According to our author, the caricature must be regarded as directed against Rumford; it is, in fact, a satire on the Count, and incidentally on the Institution which he founded. Possibly this surmise is true, but the manner in which it is reached is even more humorous than the cartoon itself. So far as we are aware, no one has been at the pains to put forward any other interpretation—certainly none which would conflict with the view which Prof. Cohen has taken, and we are therefore content to be of his opinion, since " 'tisn't worth while, it would seem, to dispute, when we know the result immaterial."

We congratulate Prof. Cohen on his interesting brochure. It is an elaborate trifle which may serve to beguile and amuse the tired researcher in his hours of ease. But if the *histoire intime* of chemical compounds, in general, say even of such things as arsenic, prussic acid, calomel or Epsom salts, were to become fashionable, what a literature we should have!

TRITUBERCULISM.

Evolution of Mammalian Molar Teeth, to and from the Triangular Type. (Biological Studies and Addresses, vol. i.) By H. F. Osborn; edited by W. K. Gregory. Pp. ix+250; illustrated. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1907.)

A QUARTER of a century ago next April, the late Prof. E. D. Cope, struck by the remarkable fact that the molar teeth, both upper and lower, of all the mammals from the Puerco or lowest Eocene horizon of North America carry three cusps arranged in triangular form, proposed what was practically the germ of the now well-known tritubercular theory. Briefly stated, this theory is to the effect that in the ancestors of all existing mammals each upper molar carried a triangle of cusps with the apex pointing inwards, while the corresponding lower teeth had a similar triangle with the apex directed outwards; and that from this primitive type have been evolved all the various modifications of molar structure, in most cases by the addition, but in certain instances by the subtraction, of cusps. The exponent, and to a great degree author, of the theory in its present form is Prof. Osborn, who has done well in laying before the scientific world the evidence for and against this fascinating doctrine.

For it has to be acknowledged that while the tritubercular theory was received with acclamation when first promulgated in its full development by the author of the volume now before us, there has of late years been a certain reaction in this respect as the result

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